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10/532,099	04/21/2005	Moshe Ben-Chorin	P-5490-US	4040

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EXAMINER
AMIN, JWALANT B

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

	Application No.	Applicant(s)
Office Action Summary	10/532,099	BEN-CHORIN ET AL.
	Examiner	Art Unit	
	Jwalant Amin	2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _17 March 2007_.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-41_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-41_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

Response to Arguments

1.   Applicant's arguments with respect to claims 1-41 have been considered but are moot in view of the new ground(s) of rejection.

2.   Regarding claim 1-41, the applicant argues that Taniguchi does not disclose "wherein said adjusting comprises calculating an adjusted intensity value for said first primary component using a conversion operator dependent on one or more of the intensity values of at least one of the first and second primary color components." (see page 11 paragraph 3 of applicant's remarks).

      However, the examiner interprets that Taniguchi in view of Hill teaches the above limitation. Please refer to the rejection of claim 1 below for details.

Claim Rejections - 35 USC § 103

3.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4.   Claims 1-3, 6-13, 15-16, 22-24, 26-32, 34-36 and 38-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taniguchi et al. (US 6,366,291 B1; hereinafter Taniguchi), and further in view of Hill et al. (US 6,243,070 B1; hereinafter Hill).

5.	Regarding claims 1 and 32, Taniguchi teaches a method of selectively adjusting colors (R, G and B display signals) displayed by a color display (color monitor), the method comprising adjusting an intensity value of a first primary color component of a pixel (pixels are inherent to a color image displayed on a color monitor; the intensity of red, green or blue primary color is adjusted using equation 1) based, at least in part, on an intensity value of a second primary color component of said pixel (the intensity of red primary color is adjusted using the intensity values of green and blue primaries) (col. 7 lines 41- 67, equation 1, col. 8 lines 16-62). Taniguchi further teaches adjusting comprises calculating an adjusted intensity value (r', g', b' are the adjusted intensities values of the primary colors red, green and blue) for said primary color component using a conversion operator (inverse matrix) (col. 7 lines 64-67, col. 8 lines 1-8, col. 13 lines 41-46).

Although Taniguchi teaches the above limitations, Taniguchi does not explicitly teach using conversion operation dependent on one or more of the intensity values of at least one of the first and second primary color components. However, Hill teaches to determine if the luminous intensity values of the current pixel should be adjusted to reduce or eliminate color artifacts (col. 20 lines 38-54, col. 21 lines 36-61, col. 22 lines 6-31; the absolute difference between the red and green color of the current pixel is compared to a threshold and if the difference is greater than the threshold then new values are assigned to red and green color of the current pixel, and if the difference is smaller than threshold the values remain the same; in the case when the values of red and green of the current pixel remains unaltered depending on the threshold, the new

value of red and green will be equal to the current red and green values of the pixel; once the new values are assigned to the pixel, the matrix of Taniguchi uses these new values to convert to device dependent data, thus making it a two-step process; the equations that assigns new values to red and green corresponds to the conversion operator; red and green color of the current pixel correspond to at least one of the first and second primary color components). Therefore, it would have been obvious to one of ordinary skill in art at the time of present invention to use a conversion operator depending on a predetermined threshold as taught by Hill and apply it into the system of Taniguchi because making adjustments to luminous intensity values of the current pixel as required helps to eliminate color artifacts (col. 20 lines 38-42).

6.   Regarding claim 2, Taniguchi teaches pixel comprising three or more primary color components (RGB color signals; col. 7 lines 41-44).

7.   Regarding claim 3, Taniguchi teaches that said pixel comprises three primary color components (RGB color signals; col. 7 lines 41-44) and wherein said adjusting comprises adjusting the intensity value of said primary color component based on intensity values of all said three primary color components (the intensity value of red is adjusted based on the intensity values of all three primaries red, green and blue; equation 1, col. 8).

8.   Regarding claim 6, Taniguchi teaches performing said adjusting (reproducing) for a plurality of pixels of a color image (pixels are inherent to color patches) to be displayed by said color display (color monitor) (col. 9 lines 52-55).

9. Regarding claim 8, Taniguchi teaches said conversion operator comprises a conversion inverse matrix (inverse matrix) to convert the intensity values of said primary color components in an absolute data format (the values displayed by the 3x3 matrix in equation 1 represents the intensity values of primary color components in an absolute data format) into corresponding values in a device-dependent data format (XYZ) (equation 1, col. 8 lines 4-8, col. 13 lines 41-46).

10. Regarding claim 9, Taniguchi teaches one or more elements of said conversion inverse matrix are dependent on one or more of the intensity values of said primary color components (equation 1; r' is dependent on the intensity values of primary colors red, green and blue) (equation 1, col. 8 lines 4-8, col. 13 lines 41-46).

11. Regarding claim 10, Taniguchi teaches conversion inverse matrix corresponds to an inverse of a direct conversion matrix (matrix expressed by equation 8) (col. 1 lines 4-8, col. 13 lines 19-46).

12. Regarding claim 11, Taniguchi teaches said direct conversion matrix comprises elements (values of the 3x3 matrix of equation 8) dependent on the intensity values of said primary color components (values of the 3x3 matrix in equation 8 correspond to red, green and blue primary in the color monitor) (col. 13 lines 19-40).

13. Regarding claim 12, Taniguchi teaches determining an initial conversion operator (determining the ratio of maximum luminances of red, green and blue in actual color monitor when the white of D50 is used as white corresponds to initial conversion operator; equation 3 col. 13; matrix of equation 8); and converting the intensity values of said primary color components (red, green and blue represented by values r', g' and b'

in the actual color monitor) into initial converted intensity values (intensity values of

XYZ) using said initial conversion operator (matrix of equation 8) (col. 13 lines 3-35)..

14.   Regarding claim 13, Taniguchi teaches determining said initial conversion

operator comprises selecting one or more initial intensity values (the matrix is obtained

for white of D50, and thus if a white for another color temperature is used then it would

select different intensity values of red, green and blue of the actual color monitor) (col.

13 lines 3-18).

15.   Regarding claim 15, Taniguchi teaches adjusting said conversion operator (the

matrix of XYZ values in actual color monitor is adjusted to the virtual color space

represented by x, y and Y values of the colors red, green and blue) based on said

converted values (values L^*, a^* and b^* in the uniform color space are the corresponding

values or red, green and blue in the actual color monitor) to provide an adjusted

conversion operator (matrix of equation 9 is the adjusted conversion operator); and

converting the intensity values of said primary components (r'g'b' represent the primary

components in virtual color space) using said adjusted conversion to provide adjusted

converted intensity values (XYZ values in equation 9 represent the adjusted converted

intensity values in a virtual color space) (col. 13, col. 14).

16.   Regarding claim 16, Taniguchi teaches adjusting comprises calculating elements

(XYZ values in equation 9) of an adjusted direct conversion matrix based on said

converted values (values represented by the 3x3 matrix in equation 9 represents

adjusted direct conversion matrix based on converted values L^*, a^* and b^* corresponding

to x, y and Y values with respect to the colors expressed by the red, green and blue in

virtual color space); and constructing an inverse matrix (inverse matrix represented by equation 10) by inverting said adjusted direct conversion matrix (matrix represented by equation 9) (col. 14 lines 28-50).

17.   Regarding claim 22, Taniguchi teaches said adjusting comprises obtaining one or more device-dependent intensity values (XYZ values in equation 9) corresponding to one or more imaginary (virtual) intensity values (r'g'b' of equation 9 representing values in virtual color monitor) of said primary color components (r'g'b' corresponds to red, green and blue); and combining one or more of said device dependent intensity values (equation 4-7 uses combination of device dependent intensity values XYZ) (col. 13 equations 4-7, col. 14 lines 34-50).

18.   Regarding claim 23, Taniguchi teaches said imaginary intensity values (r'g'b' in equation 9) comprise the intensity values of said primary color components (r'g'b' represent intensity values of primary colors red, green and blue in virtual color space) (col. 14 lines 41-50).

19.   Regarding claims 24, Taniguchi teaches obtaining said imaginary intensity values (r'g'b' in equation 10) by applying a predefined conversion operator (3x3 matrix of equation 10) to input intensity values (values in 3x3 matrix corresponding to red, green and blue) of said primary color components (equation 10, col. 14).

20.   Regarding claim 26, Taniguchi teaches each of said device dependent values (XYZ) correspond to one of said primary color components (r'g'b') (equation 9, col. 14; in equation 9, the value X corresponds to all three values r', g' and b').

21.   Regarding claim 27, Taniguchi teaches said combining comprises combining said device-dependent values based on said primary color components (equation 9, col. 14; in equation 9, the value X corresponds to the combination of all three values r', g' ·and b').

22.   Regarding claim 28, Taniguchi teaches combining comprises calculating a sum of the device dependent values corresponding to each of said primary color components (equation 9, col. 14).

23.   Regarding claim 29, Taniguchi teaches adding (equation 10) a sub-adjustment value (individual elements representing the intensity values of the 3x3 matrix in equation 10) to a first imaginary intensity value (r') based on a second imaginary intensity value (g'), said first and second imaginary intensity values corresponding to said first and second primary color components (r' corresponds to red and g' corresponds to green primary colors), respectively (equation 10, col. 14).

24.   Regarding claim 30, the statements presented above, with respect to claims 29 and 23, are incorporated herein.

25.   Regarding claim 31, the statements presented above, with respect to claims 29 and 24, are incorporated herein.

26.   Regarding claim 34, the statements presented above, with respect to claims 32 and 22, are incorporated herein.

27.   Regarding claim 35, the statements presented above, with respect to claims 32 and 23, are incorporated herein.

28.   Regarding claim 36, the statements presented above, with respect to claims 32

and 24, are incorporated herein.

29.   Regarding claim 38, the statements presented above, with respect to claims 32

and 29, are incorporated herein.

30.   Regarding claim 39, the statements presented above, with respect to claims 32

and 23, are incorporated herein.

31.   Regarding claim 40, the statements presented above, with respect to claims 32

and 24, are incorporated herein.

32.   Regarding claim 18, Taniguchi teaches all of the claimed limitations as stated

above, except that he does not explicitly disclose comparing said initial converted

intensity values (XYZ values in actual color space) and said adjusted converted

intensity values (XYZ values in virtual color space). However, Taniguchi does an

indirect comparison between the color conversion of XYZ to r'g'b' and from r'g'b' to RGB

in actual color space and the color conversion of XYZ to r'g'b' and from r'g'b' to RGB in

virtual color space (col. 9 lines 5-15, col. 15 lines 10-21). Therefore, it would have been

obvious to one of ordinary skill in the art at the time of present invention to compare the

initial converted intensity values and the adjusted converted intensity values as taught

by Taniguchi because this shows that the adjusted converted intensity values gives a

better resolution as the color conversion from XYZ to r'g'b' and from r'g'b' to RGB in

virtual color space prevents from losing the information regarding the desired color

which is lost by color conversion of XYZ to r'g'b' and from r'g'b' to RGB in actual color

space resulting in abnormal tone or a change in hue (col. 9 lines 5-15, col. 15 lines 10-21).

Regarding claim 19, Taniguchi teaches re-initializing said conversion operator according to said adjusted conversion operator (col. 15 lines 4-9; XYZ to r'g'b' conversion uses the matrix of equation 10 in virtual color space instead of using the matrix of equation 1 in actual color space, which corresponds to re-initializing said conversion operator according to said adjusted conversion operator).

Regarding claim 20, Taniguchi teaches re-initializing said conversion operator comprises substituting elements of said initial conversion operator with respective values of said adjusted conversion operator (col. 15 lines 4-9; XYZ to r'g'b' conversion uses the matrix of equation 10 in virtual color space instead of using the matrix of equation 1 in actual color space, which corresponds to re-initializing said conversion operator by replacing the elements of said initial conversion matrix in actual color space with the elements of said adjusted conversion matrix in virtual color space).

Regarding claim 21, Taniguchi discloses all of the claimed limitations as stated above, expect that he does not explicitly teach to repeat said adjusting, said converting based on said adjusted conversion operator, and said re-initializing, until a pre-determined difference between said initial converted intensity values and said adjusted converted intensity values is achieved. However, he describes to select vertexes R5, G5 and B5 representing virtual chromaticity coordinates in virtual color space having the same hues as those of the actual chromaticity coordinates of actual color space R0, G0 and B0, and converting the XYZ values to r'g'b' based on the relationship of color

conversion obtained for the virtual color monitor enabling the resulting r', g' and b' to be

within the color range of 0 to 1 of reproducible gamut in virtual color monitor (col. 10

lines 63-67, col. 11, col. 12 lines 1-51, col. 15 lines 10-21; though Taniguchi does not

teach to repeat the procedure but it would be possible to repeat the procedure by

selecting the vertexes with less than 5% higher saturations than those of the actual

chromaticity coordinates in actual color space, and gradually keep on selecting the

vertexes with higher saturations until they result in the chromaticity coordinates in virtual

color space that would produce the r'g'b' values in the range 0 to 1). Therefore, it would

have been obvious to one of ordinary skill in the art at the time of present invention to

repeat the procedure of Taniguchi to obtain the vertexes in virtual color space to

produce the r'g'b' values in the range of 0 to 1 because such procedure will ensure that

the very first vertexes in virtual color space with saturations higher than the vertexes of

actual chromaticity coordinates in actual color space are obtained as this will keep the

increase in the reproducible gamut range to minimum.

33.   Claims 4-5 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Taniguchi, in view of Hill, and further in view of Childs et al. (GB 2,282,928 A;

hereinafter Childs).

34.   Regarding claim 4, Taniguchi and Hill disclose the claimed limitations as stated

above, except that they do not explicitly teach three or more primary color components

comprise four or more primary color components. However, Childs teaches to use four

or more display primaries (Fig. 3 shows two green primaries besides red and blue).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of present invention to use four or more display primaries as taught by Childs into the method of Taniguchi and Hill because using four or more primaries will provide a wider color gamut (pg. 1 paragraph 2).

35.   Regarding claim 5, Taniguchi and Hill disclose the limitations as stated above, except that they do not explicitly teach adjusting comprises adjusting the intensity value of said first primary color component based on intensity values of one or more of said four or more primary color components. However, Childs teaches to adjust the intensity values of a first primary color based on intensity values of one or more primary colors (equation 3i, pg. 11; P1, P2, P3 and P4 corresponds to four or more primary color components). Therefore, it would have been obvious to one of ordinary skill in the art at the time of present invention to adjust intensity of a first primary color based on intensity values of all other primary colors as taught by Childs and use it into the method of Taniguchi and Hill because it results in simplifying some of the complexity of the decoder used for a four primary display device from a three primary transmission system (pg. 12 paragraph 3, pg. 15 lines 1-3).

36.   Regarding claim 33, Taniguchi and Hill disclose the limitations as stated above, except that they do not explicitly teach a driver to receive said adjusted intensity value from said color adjustment unit and to drive a color display device according to said adjusted intensity value. However, Childs teaches to determine display drive signals (driver to drive a color display device) from a coded transmission signal (adjusted intensity value) from a three primary transmission system (primary color components in

color adjustment unit) (Fig. 4, pg. 12 paragraph 3). Therefore, it would have been obvious to one of ordinary skill in the art at the time of present invention to drive the color display device as taught by Childs and use it into the method of Taniguchi and Hill because the gain control of each drive signal is used to set up the procedure for white balancing (pg. 12 last paragraph).

37.   Claims 17, 25, 37 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taniguchi, in view of Hill, and further in view of Lin (US 6,160,644).

38.   Regarding claim 17, Taniguchi and Hill disclose the limitations as stated above, except that they do not explicitly teach using one or more look up tables (input LUT) to associate each of said converted values (scanned RGB values) with a set of device dependent XYZ values (XYZ values); and constructing said adjusted direct conversion matrix (input LUT comprising table entries is used as a direct conversion matrix) using said XYZ values. However, Lin teaches exactly the same (col. 3 lines 1-11). Therefore, it would have been obvious to one of ordinary skill in the art at the time of present invention to use look up tables for converting scanned RGB values into device-dependent XYZ values as taught by Lin and use it into the method of Taniguchi and Hill because look up tables helps transformation of output device in-gamut colors using interpolation (col. 3 lines 31-33).

39.   Regarding claim 25, the statements presented above, with respect to claims 22 and 17, are incorporated herein.

40.   Regarding claim 37, Taniguchi and Hill disclose the limitations as stated above,

except that they do not explicitly teach said logic unit comprises one or more memory

units to store one or more look up tables to associate each of said one or more

imaginary intensity values with a respective plurality of said device values. However, Lin

teaches to use only enough memory to store one transformation LUT (col. 15 lines 1-4;

please refer to rejection of claim 17 for further arguments). Therefore, it would have

been obvious for one of ordinary skill in art at the time of present invention to store only

one transformation lookup tables in memory as taught by Lin and use it into the method

of Taniguchi and Hill because storing only one transformation LUT in memory will save

considerable memory otherwise required to store the transformation LUT for each input

device (col. 14 lines 29-32, col. 15 lines 3-4).

41.   Regarding claim 41, the statements presented above, with respect to claims 38

and 37, are incorporated herein.

42.   Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over

Taniguchi, in view of Hill, and further in view of Tanner et al. (US 6,496,160 B1;

hereinafter referred to as Tanner).

43.   Regarding claim 14, Taniguchi and Hill disclose the limitations as stated above,

except that they do not explicitly teach said initial intensity values (intensity of a given

pixel) are selected according to intensity values of primary color components of a

neighbor pixel adjacent (adjacent pixels) to said pixel. However, Tanner teaches to

calculate the intensity of a given pixel from adjacent pixels (col. 4 lines 12-14).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of present invention to calculate the intensity of a given pixel as taught by Tanner and use it into the method of Taniguchi and Hill because this results in smoother appearing lines and edges of objects to be displayed on the raster display unit (col. 4 lines 14-15).

Conclusion

44.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Venit et al. ("Elementary Linear Algebra", 1981) teaches to convert equations (used by Hill) into matrices (used by Taniguchi) (page 54-55).

45.   Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later

than SIX MONTHS from the date of this final action.

46.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Jwalant Amin whose telephone number is 571-272-

2455. The examiner can normally be reached on 9:30 a.m. - 6:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Mark Zimmerman can be reached on 571-272-7653. The fax phone number

for the organization where this application or proceeding is assigned is 571-273-8300.

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J.A.   5|23|07

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